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An Assessment of Three Reports Concerning Air Quality in the Lower Hunter Region

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Executive summary

This report is an assessment of the detailed reports prepared for the NSW EPA which address air quality in the region around Newcastle's port precinct.

OEH's ambient air quality monitoring network indicates that air quality in the Lower Hunter is on a par with the air quality experienced in Sydney and the Illawarra. The Lower Hunter routinely meets the national ambient air quality standards and goals for ozone, carbon monoxide, sulfur dioxide (SO_2), nitrogen dioxide (NO_2) with exceedences generally related to high particle concentrations (particles 10 microns and smaller (PM_{10}) and particles 2.5 microns and smaller ($PM_{2.5}$)) from extreme events such as bushfires and dust storms.

Industrial emissions account for only part of the total pollutant load in the Newcastle region. However, on a local neighbourhood scale, they can be important determinants of air quality for residents in areas close to their operations.

The industrial area in the port precinct is well served with ambient air quality monitoring carried out by industry at 22 locations. However, while industry monitors are numerous, they are generally sited to monitor site-specific emissions. As such, when combined, they do not constitute a strategic local area network.

An analysis of these data shows that while industrial emissions contribute to occasional high concentrations of particles (as Total Suspended Particulates (TSP) and PM_{10}) and nitrogen dioxide, air quality in the port is generally good.

Based on the assessment of available information we conclude that:

- Regional air quality in the Lower Hunter is adequately described by the current OEH monitoring sites at Newcastle, Wallsend and Beresfield and, with the exception of extreme events (bushfires and dust storms), generally meets national ambient air quality standards and goals.
- Industry ambient air quality monitoring around the port precinct is comprehensive but has a different purpose to OEH's regional network; it is premises-specific and focussed primarily on particles, with some NO_2 and SO_2 monitoring.
- These industry monitoring data show that while industrial emissions contribute to occasional high concentrations of particles (as TSP and PM_{10}) and nitrogen dioxide, air quality in the port is generally good.
- While nothing in these reports points to a broad scale air quality problem due to industrial emissions around the port, the potential impact on air quality in surrounding suburbs of the proposed future industrial expansion in the port provides an opportunity to review the effectiveness of the current monitoring arrangements around the port.
- Community input should be sought during any review process to ensure transparency and community acceptance of any proposed changes to monitoring in the port precinct.

Introduction

In response to the August 2011 Orica incident in Newcastle, the NSW Government announced a series of legislative reforms and other initiatives to improve industry's environmental performance and the community's access to information about industrial activities and any incidents that occur at industrial sites. One of these initiatives was the proposal for the establishment of an industry funded environmental monitoring network in the Lower Hunter, with the initial focus on the Newcastle Local Government Area (LGA).

To give effect to this initiative, on 9 October 2011 the Minister for the Environment, Robyn Parker MP, directed the NSW EPA under s.295Y of the *Protection of the Environment Operations Act 1997*, to immediately commence an investigation into the need for an environmental monitoring program in the vicinity of the heavy industrial precincts(s) within the Lower Hunter area, including but not limited to the suburbs of Stockton and Mayfield, where a cluster of industries may be having significant cumulative impact or impacts on population centres and the environment more generally.

Specifically the NSW EPA must investigate:

- whether pollution impacts are occurring or have the potential to develop in the area
- the nature of those impacts (such as cumulative, hot spot or site-specific)
- the type of pollutant(s) that appear to be causing the impacts and in general where they are occurring
- the need for a program to monitor the identified pollutants, and
- whether the program should be funded by licence holders or particular classes of licence holders.

Commissioned reports

Three reports were commissioned to address the questions:

Report 1: Review of Meteorology in the Newcastle Inner City and Port Neighbourhood

This study collates existing meteorological data from all available OEH, Bureau of Meteorology and industry monitoring stations to identify seasonal patterns in local meteorology. These data are then combined with local industry emissions data to provide recommendations on the preferred locations of ambient air quality monitoring sites to monitor the combined impact of local industry emissions (point and diffuse sources of fine particles only) from the Newcastle inner city and port neighbourhood on current and future populations in the neighbourhoods of Fern Bay, Stockton, Carrington, Islington, Wickham, Newcastle West, Mayfield and Warabrook, i.e. within a 10 km by 10 km study boundary.

Report 2: Lower Hunter Ambient Air Quality Review of Available Data

This report summarises all available ambient air quality monitoring data. The monitoring sites include the OEH regional monitoring sites and industry sites. The data are compared with the air quality standards as defined by the National Environment Protection (Ambient Air Quality) Measure (Air NEPM), the National Environment Protection (Air Toxics) Measure (Air Toxics NEPM) and the impact assessment criteria contained in the *Approved Methods for Modelling and Assessment of Air Pollutants* published by the NSW EPA.

The report also presents a summary of estimated air emissions from all sources in the Newcastle City Council Local Government Area (Newcastle LGA), roughly a 20 km by 20 km grid, based on the results of the NSW Greater Metropolitan Region air emissions inventory. It includes a prioritisation of industrial facilities in the Newcastle LGA according to the potential short and long term health impacts.

Report 3: Newcastle Local Government Area Environment Protection Licence Summary

This report provides an overview of the current source emission air quality monitoring requirements associated with 64 premises in the Newcastle LGA. There are 12 premises which are authorised by an Environment Protection Licence to discharge pollutants to air from point source(s) (stacks) in the Newcastle LGA. The NSW EPA currently regulates these premises through Environment Protection Licences (EPLs). The report summarises the level of compliance by these 12 industries with licence and regulatory requirements. The report also describes the range of regulatory actions taken by the NSW EPA to address key issues associated with air quality at specific premises over the past five years.

Discussion

Air quality in the Lower Hunter is monitored at several levels:

Regional air quality site locations are defined by the Air NEPM. They are population-based and are located so that they contribute to obtaining a representative measure of the air quality likely to be experienced by the general population in the region or sub-region.

Neighbourhood monitoring sites are located to monitor major non-localised emissions. They monitor air quality on a smaller scale.

Industry monitoring sites are located to monitor emissions from a specific source.

Current status

Regional air quality

The existing monitoring sites located at Newcastle, Wallsend and Beresfield were established in 1992–93. They conform to the Air NEPM requirements of providing a representative measure of regional air quality across the Lower Hunter region.

These sites also provide historical trend analysis of regional air quality. All sites comply with the Air NEPM standards when the influence of extreme events such as bushfires and dust storms on PM_{10} and $PM_{2.5}$ are removed.

Overall air quality in the Lower Hunter is as good – or better than – air quality in Sydney and the Illawarra.

Neighbourhood monitoring

Neighbourhood monitoring has been introduced at sites to determine potential population exposure to elevated levels of emissions due to local industry.

The Australian Nuclear Science and Technology Organisation has had an air quality monitoring station at Mayfield measuring $PM_{2.5}$ concentrations since 2000. Data collected from this site are below the $PM_{2.5}$ advisory reporting standard when the extreme events such as bushfires and dust storms are removed.

Detailed analysis of $PM_{2.5}$ sampled particles to determine the major chemical components found that sea spray, wind blown soil, sooty or black carbon, ammonium sulfate and organics were the major components. This profile remained fairly consistent across all years from 2000 to 2010. These data were analysed further to determine the source contribution to $PM_{2.5}$ concentrations, averaged from 1998 to 2009. The sources identified were vehicles 27 per cent, secondary sulfate 23 per cent, smoke 20 per cent, sea salt 16 per cent, industry 9 per cent and soil 5 per cent.

Monitoring of selected organic compounds has also been commissioned by the Hunter Development Corporation at Mayfield. The data shows that Mayfield is generally in compliance with the Minimum Investigation Levels (MILs) in the Air Toxics NEPM.

Air quality modelling specifically designed to investigate the impact on local suburbs of PM_{10} emissions from industries in the Newcastle inner city and port neighbourhood showed that maximum concentrations occur within the port region and that PM_{10} concentrations generally decrease with distance from this area. However, if there were any impacts from the local industry these are anticipated to occur within the suburbs of Warabrook, Mayfield, Carrington and Fern Bay. The modelling also shows that the current population exposure to PM_{10} concentrations is well below the Air NEPM standards.

Industry monitoring

Industry data cannot be compared directly with the Air NEPM standards. The monitoring site locations are site specific. The numerical Air NEPM standard concentrations can be used as a reference only.

Industry monitoring sites are defined as those operated by industry and are generally required as a result of conditions attached to any planning approval or to the Environment Protection Licence for that premises. As such, they are site- and industry-specific, cover a limited range of pollutants, and are sited specifically where the maximum ground level pollutant concentration is predicted.

There are a total of 22 sites included in Report 2. These sites are located based on the individual industry emission characteristics. All sites except those operated by Tomago Aluminium, measure Total Suspended Particulates (TSP); several also include PM_{10} and two sites monitor oxides of nitrogen. The six sites operated by Tomago Aluminium monitor sulfur dioxide.

All sites were generally in compliance with the Air NEPM numerical standards with the exception of elevated PM_{10} at the Newcastle Port Corporation monitoring site at Mayfield 4 berth, and a few exceedences of local elevated nitrogen dioxide levels at the Orica Roxburgh Street monitoring site.

TSP levels were occasionally above the nuisance criteria at the OneSteel monitoring site, East Drain, and infrequently above at the Graincorp and ConPorts monitoring sites. There were occasional high concentrations of sulfur dioxide at the Farm monitoring site in the vicinity of the Tomago Aluminium Smelter.

The Newcastle Port Corporation, OneSteel Recycling Pty Ltd, Graincorp Operations Limited and Orica Australia Pty Ltd complied with their licence and Regulation air emission limits by 2010.

Summary and conclusions

Regional air quality monitoring for the Lower Hunter region is adequately described by the current OEH monitoring sites at Newcastle, Wallsend and Beresfield. Monitoring has demonstrated compliance with the Air NEPM and air quality is equal to that in the Sydney and Illawarra regions.

Newcastle and the ports area are fairly well covered by industry monitoring sites. The impacts from industry are site specific and the type of pollutant monitored depends on the nature of the industry. Most sites monitor TSP and a few monitor PM_{10} concentrations as well. Generally there are few exceedences of licence conditions.

The NSW EPA has addressed Environment Protection Licence non-compliance by including Pollution Reduction Plans as licence conditions. These require upgrades to plant and equipment and further emission source monitoring to inform further improvement actions.

Neighbourhood monitoring in Mayfield demonstrates that industry contributes only 9 per cent to $PM_{2.5}$ ambient concentrations. Additional monitoring in Mayfield demonstrated compliance with the Minimum Investigation Levels specified in the Air Toxics NEPM.

These reports do not indicate any current air quality problem in the port precinct. However, the general community has concerns regarding the impact of local industrial emissions on their community. Making industry data publicly available may allay these concerns. A necessary caveat on this would be that continuous monitoring at all sites would be introduced to align monitoring with updated Australian Standards. Specific campaign monitoring for particle composition, for example, could still be undertaken if desired.

The only area identified as a potential future issue is the impact of industry expansion on the community in surrounding suburbs. Even though the modelling suggests that PM_{10} concentrations in the local areas are currently well below the Air NEPM standard, neighbourhood monitoring in Stockton, Fern Bay and Mayfield would provide information on any change in population exposure as a result of new industry.

Prior to putting in any additional monitoring stations, the current industry monitoring network should be reviewed to ensure relevance (priority pollutants are targeted and siting is still appropriate). This review should also consider changes to monitoring technology (continuous measurement) and community access to ambient monitoring data.

The outcome of the review would indicate whether any additional neighbourhood monitoring sites in Stockton, Fern Bay and Mayfield are required. An additional benefit would be the opportunity and means to track the impact on air quality of any expansion in the port and also track the effectiveness of NSW EPA's regulatory activities.

Community input should be sought during any review process to ensure the priority issues are identified, to provide transparency and to achieve community acceptance of any proposed changes to monitoring in the port precinct. Potential future monitoring requirements should be refined based on community need for air quality information.